



Tennessee's Imperiled Cave Beetles

The U.S. Fish and Wildlife Service (Service) is currently looking at six rare Tennessee cave beetles to see if they need to be placed on the federal endangered species list.

- Coleman Cave beetle – *Pseudanophthalmus colemanensis*
- Fowler's Cave beetle – *Pseudanophthalmus fowlerae*
- Inquirer cave beetle – *Pseudanophthalmus inquisitor*
- Insular cave beetle (aka Baker Station Cave beetle) – *Pseudanophthalmus insularis*
- Noblett's Cave beetle – *Pseudanophthalmus paulus*
- Soothsayer cave beetle (aka Indian Grave Point cave beetle) – *Pseudanophthalmus tiresias*

The Service has been asked by an outside group to place two of the beetles, Coleman Cave beetle, and Inquirer cave beetle, on the endangered species list. The others are being considered because the Service already considered them candidates for Endangered Species Act protection.



Coleman Cave beetle, credit Alan Cressler



Protecting the entrance to Bellamy Cave, home of the Coleman Cave beetle, credit USFWS

Description

The six beetles are cave-dependent, predatory ground beetles, feeding on small cave invertebrates like spiders, mites, and millipedes. All of the cave beetles are fairly small, eyeless, reddish-brown insects. Like other insects, they have six legs and a body that consists of a head, thorax, and abdomen. Depending on the species, body length ranges from 3.0 to 8.0 millimeters (mm) (0.12 to 0.32 inches). The different beetles are distinguished by differences in the shape and size of the various body parts, especially the shape of some male appendages.

Habitat

The limestone caves where these beetles live are fragile environments, supporting a variety of species that have evolved to survive and reproduce under the demanding cave conditions. No photosynthesis takes place (green plants or algae) within the dark zone of a cave, therefore, all organisms adapted to life within a cave depend on food that comes from the surface. This can be in the form of leaf litter, woody debris or small bits of organic matter that washes

or falls into the cave, or guano deposited by cave-dependent bats that feed on the surface and return to the cave to roost.

Range

- Coleman Cave beetle - discovered in Coleman Cave, Montgomery County, Tennessee in 1957. In 2004, a single individual was found in Foster Cave, which is on a preserve owned by the Tennessee Department of Environment and Conservation. In 2006 it was discovered in Bellamy Cave and Darnell Spring Cave, though Darnell Spring Cave was recently found to be connected to Foster, Darnell, and Cooper Creek caves. It's also found in Clarksville Lake Cave.
- Fowler's Cave beetle is only known from Sheals Cave, a privately-owned site in Clay County, Tennessee. It hasn't been seen since 1965.
- Inquirer Cave beetle is also only known from Sheals Cave.
- Insular cave beetle – known from two caves in Tennessee's Davidson County – Baker Station Cave, and Bull Run Cave, both of which are privately-owned. It was seen at Baker Station Cave in 2013, though it hasn't recently been seen at Bull Run Cave.
- Soothsayer cave beetle – known from two privately-owned caves in Tennessee's DeKalb County – Indian Grave Point Cave and Fox Cave. It hasn't been seen in Indian Grave Point Cave since 1956, nor has it recently been seen in Fox Cave.
- Noblett's Cave beetle – known only from Noblett's Cave, a privately-owned site in Monroe County, Tennessee. It hasn't been seen since 1967.

U.S. Fish & Wildlife Service

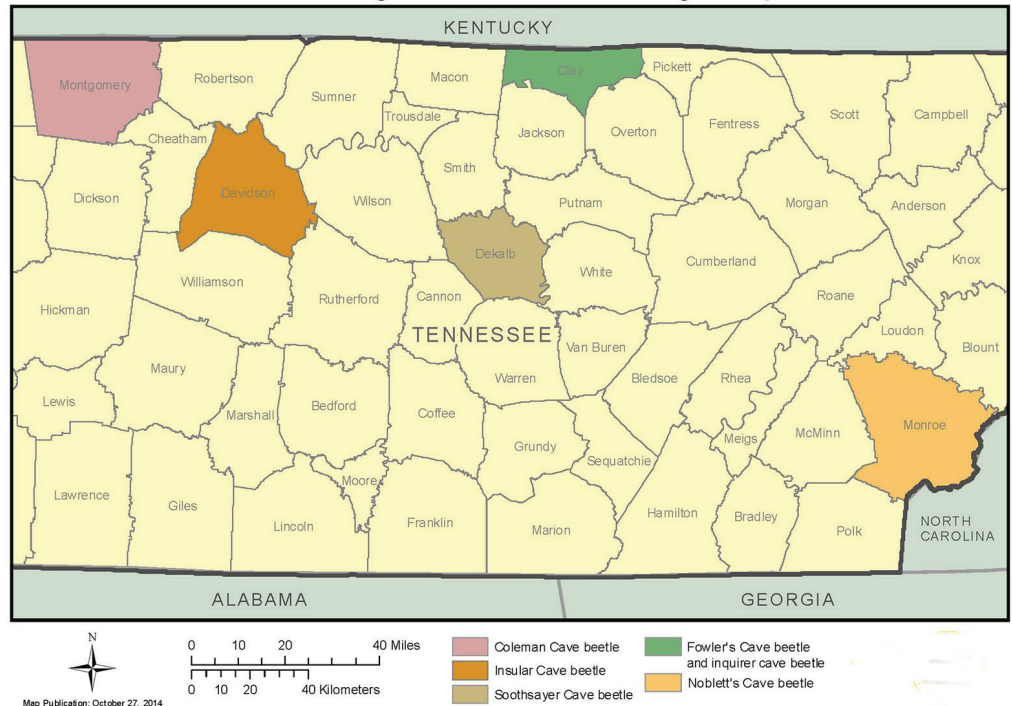
Threats

The limited distributions of these cave beetles make them vulnerable to isolated events that would only have a minimal effect on more wide-ranging beetles. Events such as toxic chemical spills, discharges of large amounts of polluted water, blocking or altering existing cave entrances, or the creation of new entrances can affect food reaching the areas where the beetles forage.

- Poorly-planned development projects can directly destroy caves or severely damage the natural processes crucial to cave life.
- Pollution and chemical contamination can, under certain circumstances, result in the complete destruction of unique cave life. Baker Station Cave, home to the Insular Cave beetle, was once used as a domestic water supply, but a nearby landfill and pollution from other sources contaminated the water to the point that it is no longer used for drinking water and severe pollution of springs and creeks in the vicinity of the cave has been observed. Even actions that might be considered less severe, like dumping trash in a cave, can damage a cave's fragile community.
- The basis of the cave food chain comes from outside the cave - bat guano, woody debris washed or blown into the cave, or tiny bits of plant or animal matter carried by water through small cracks in the rocks overlaying the cave. With the spread of the bat-killing disease white-nose syndrome into Tennessee, it's likely that populations of cave-hibernating bats will decline drastically. The subsequent loss of guano could have cascading effects on cave animals, including cave beetles, as that food source disappears.
- These cave beetles are known to occur at a rather limited number of locations. Most populations are extremely small, and careless cave exploration and vandalism could have an impact on population sizes, as could scientific collecting or collecting for other purposes.

Dependence upon the surface makes caves and the animals within them vulnerable to actions that take place well outside and away from the cave. Protection of caves and cave-dependent species must include both the physical environment where they are found and the surface components that provide the food and clean water needed for survival of these cave animals.

Counties with Cave Beetles being considered for the Endangered Species List in 2015



Conservation measures

- Coleman Cave beetle – in 2001, the owners of Coleman Cave, The Nature Conservancy, Tennessee Wildlife Resources Agency, the Service and others entered into a cooperative management agreement for the cave. Foster Cave was purchased by The Nature Conservancy and transferred to the Tennessee Department of Environment and Conservation. Property that included the main entrance to Bellamy Cave was purchased by The Nature Conservancy and transferred to the Tennessee Wildlife Resources Agency for long-term management and protection.
- Fowler's Cave beetle and inquirer cave beetle - Sheals Cave is currently protected by the landowner from any physical alterations that could adversely affect the species; and in 2005, the landowners entered into a cooperative management agreement for the cave with The Nature Conservancy, Tennessee Wildlife Resources Agency, and the Service.

What does it mean for an animal to be on the endangered species list?

When an animal is placed on the federal endangered species list, it makes it illegal to kill, shoot, trap, harass, harm, pursue, wound, capture or collect it without a permit from the Fish and Wildlife Service. Typically permits are only given to individuals for efforts that ultimately benefit the species.

Additionally, projects that are federally-funded or authorized are reviewed for impacts to the animals, as these projects

typically can't jeopardize the existence of a species. Efforts are made to minimize, or hopefully eliminate, impacts.

What can you do to help

- Place trash in its proper place. Dumping in caves can introduce chemical contamination, obstruct the movement of animals in and out of the cave, and hinder the movement of plant and animal material (food sources) into the cave. Even dumping on the land's surface can lead to contaminants trickling into groundwater that then flows into a cave.
- When planning any earth-disturbing project, pay close attention to the possibility of the project affecting a nearby cave or groundwater that may percolate to a cave. Often it's difficult or impossible to tell where groundwater flows or how a cave network spreads out underground, so efforts to maintain groundwater quality and flow are helpful.
- To minimize the possibility of inadvertently spreading the fungus that causes white-nose syndrome, the Service recommends staying out of caves completely, which also protects cave life from accidental trampling.
- Maintain native trees and other woody plants around cave entrances. This benefits animals like bats and wood rats that deposit organic material in the caves as a foundation for the food web, thereby supporting cave beetles. These woody plants also help protect water quality and help maintain climatic conditions within caves.